The minimum is always comparatively low on radiation nights where there is little if any warm free air available for interchange. This condition is most pronounced on the valley floor, but also quite evident in a sheltered cove, even though located on a slope. For the same reason the minima are lower on gradual slopes than on steep slopes, a given area on the latter having a much larger amount of warm free air facing it and at the same time not being so freely exposed to the sky as to suffer the same loss through radiation as the gentle slope.

When a slope has opposing mountains close by, the minima are lower, even though these mountains, in raising the sky line, affect the loss of heat through radiation.

Although the summit of a mountain is usually situated ideally for radiation purposes, the highest minimum is, nevertheless, noted at the very summit during inversion conditions, except when either its surroundings mass is great or its vertical height is great, a knob partaking largely of the temperature of the free air.

Where the mass is great a large number of radiating surfaces are present, which serve to reduce the temperature to a greater degree than if the summit were a mere knob, and in lowering the temperature in the vicinity of the summit the center of the thermal belt is also lowered.

The center of a thermal belt is lowest on a mountain slope where there is no opposing slope near by and the mass above in the region of the summit is great. The Tryon slope is a typical example of this condition, where the highest minimum is usually found at an altitude of 400 to 500 feet above the valley floor, there often being differences of 15 to 20 degrees F. between these points separated by only a few hundred feet.

On the other hand, the center of the thermal belt is high when the slope culminates in a knob, so that there is no considerable mass near the summit, and this is so whether there are opposing slopes or not.

When opposing slopes are present in the lower levels and there is a great mass above near the summit, the thermal belt is relatively narrow, as both these conditions tend toward lower night temperatures. Such a slope, as a whole, is a cold one. If, on the other hand, a slope is steep and there are no opposing slopes near by and no great mass near the summit, the entire side of the mountain is relatively warm during night inversions.

The temperature, ordinarily, on a night of inversion falls along the entire slope, as well as on the valley floor, but with increased elevation the fall is less and less, and the center of the belt rises steadily from nightfall to dawn.

Mountain breezes do not blow down the sides of a mountain from a mere knob, but where the mass is great, as at Altapass on the main Blue Ridge, or at Tryon, the breeze is frequently observed. The mass being freely exposed with its great surface, in fact an elevated plateau, becomes covered with a blanket of cold air on radiation nights and, if the prevailing wind is favorable, after a time this cold air rushes down the side of a mountain in a more or less waterlike flow, being mechanically warmed in its descent, but nevertheless serving to lower the temperature, at least for a time, on the slope, while raising it in the valley below where the temperature has already fallen to a low point. If the wind is blowing from an unfavorable quarter, the mountain breeze does not develop, even though other favorable conditions are present.

Inversions are most frequent during the months of May and November, when the weather conditions are usually settled in the mountain region, long periods of fair weather then prevailing. They are somewhat more pronounced in the latter month because of the greater length of the night, the thermal belt rising as the length of night increases.

Inversions are almost as frequent during the summer months, but the range is small. In the winter months, when they are much less frequent, the range is great. During a period of fair weather the range of inversion increases steadily up to about the fifth night, the peak being reached at that time. Thereafter increasing vapor and impurities in the form of dust and smoke interfere with radiation. The range of inversion depends decidedly upon relative and absolute humidity. The vapor pressure controls the degree of inversion in that the loss of heat by radiation through moist air is small, while through dry air it is large.

The lowest absolute and average minima during the entire research were found in a small frost pocket at Highlands, but the lowest minimum considering altitude above sea level was found in a wide valley floor of the French Broad River near Blantyre.

The higher temperatures on the slopes and certain summits in the Carolina mountain region are favorable for fruit growing in so far as the absence of frost is concerned, as compared with the valley floors, but considerable injury often occurs from freezes in the winter and early spring in the upper and middle levels after protracted heated periods and growing weather which had served to swell the buds.

THE EFFECT OF A "LID" ON THE TEMPERATURE AND TRANSPARENCY OF THE LOWER AIR.[1]

By JACQUES W. REDWAY, Mount Vernon, N. Y.

The word "lid" was coined by Sir Napier Shaw to describe a condition in the lower atmosphere in which a warm layer overlying a cooler one acts as a limiting plane or lid to the convectional circulation of the underlying air. If the warm layer is in motion relative to the air below, as it usually is, the lid may be turbulent. The convectional currents of warm more or less hazy air rising from the surface stop and spread horizontally on reaching the lid. Thus, the haziness is confined and the amount of air to be warmed by the earth's surface is limited. When the haziness is largely due to smoke, the aviator is more concerned than the mariner, for the air is clearest near the earth's surface; but when the haziness is due mostly to moisture conditions of the air, the haze is likely to be densest at the earth's surface, unless clouds tend to form at the lid. The presence of a lid makes the temperature at Mount Vernon about the same as that in New York City (Whitehall Building). Without a lid, however, the range at Mount Vernon is several degrees greater than at New York.—*C. F. B.*

[1] Presented before the American Meteorological Society at New York Jan. 3, 1920. This paper is a rearrangement of a part of a chapter on the "Principles of the transparency of the air governing visibility," in one of the author's books.